

CLAIMS

5 1. A bristle subassembly made according to a continuous method comprising the steps of:

 (a) continuously forming a wrap of polymeric filaments by wrapping at least one filament around the axis of at least a three sided mandrel having a moving cable support on each corner running the length of the mandrel on the exterior corner of the mandrel and capable of supporting and moving the polymeric filaments of the wrap along at least a portion of the length of the mandrel;

 (b) feeding at least one base string outside of the wrap of polymeric filaments to a selected portion of the mandrel as required to form the subassembly while the polymeric filaments of the wrap are being moved at least a portion of the length of the mandrel;

 (c) bonding the base string and the polymeric filaments of the wrap together by simultaneously pressing the base string in contact with the polymeric filaments of the wrap and applying energy to the base string and polymeric filaments of the wrap; and

 (d) cutting the polymeric filaments of the wrap at a point downstream of where polymeric filaments of the wrap are bonded with the base string to form at least one bristle subassembly having at least one row of filament segments connected to at least one base string.

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 2. A bristle subassembly made according to a continuous method comprising the steps of:

 (a) continuously forming a wrap of polymeric filaments by wrapping at least one filament around the axis of a four sided mandrel having a moving endless cable support on each corner, said endless cable support runs along one corner along the length of the mandrel protruding outward from the intersection of the two side planes of the mandrel which form the corner of the mandrel and runs in an opposite direction in a recessed channel in the mandrel located on a diagonal side of the mandrel from said corner and does not protrude into the plane of the mandrel side and moves the wrap of filaments along a substantial length of the mandrel;

 (b) feeding pairs of base strings of a polymeric monofilament outside of the wrap of polymeric filaments onto each side of the mandrel while the wraps are being moved substantially the length of the mandrel;

(c) bonding the base strings and the polymeric filaments of the wrap together by simultaneously pressing the base strings in contact with the polymeric filaments of the wrap and applying energy to the bases string and polymeric filaments of the wrap; and

5 (d) cutting the polymeric filaments of the wrap at a point downstream of where the filaments of the wrap are bonded with the base strings to form bristle subassemblies having at least one row of filament segments connected between two base strings,

wherein in step (c) the bonding of the base strings and
10 polymeric filaments of the wrap together includes moving the base strings and polymeric filaments of the wrap under a wave energy source which is an ultrasonic horn positioned adjacent to the mandrel and defines an opening sufficient to allow passage of the base string and the filaments of the wrap and maintains the base string in contract with the filaments of the wrap and
15 does not allow the base strings to reposition itself and sufficient wave energy is applied to partially melt at least one of the base strings and the filament of the wraps.

3. A bristle subassembly made according to a continuous
20 method comprising the steps of:

(a) continuously forming a wrap of polymeric filaments by wrapping at least one filament around the axis of at least a three sided mandrel to form wraps of polymeric filaments of sufficient density to pack the filaments in contact with each other and having a moving cable support on
25 each corner running the length of the mandrel on the exterior corner of the mandrel and capable of supporting and moving the polymeric filaments of the wrap along a substantial length of the mandrel;

(b) applying energy to the polymeric filaments of the wrap at the corner of the mandrel thereby bonding the filaments of the wrap together
30 and forming a seam line; and

(c) cutting the polymeric filaments of the wrap at a point downstream of where the filaments of the wrap are bonded to each other to form at least one bristle subassembly having at least one row of filament segments extending from the seam line.

35 4. A bristle subassembly made according to a continuous method comprising the steps of:

(a) continuously forming a wrap of polymeric filaments by wrapping at least one filament around the axis of at least a three sided

mandrel having a moving cable support on each corner running the length of the mandrel on the exterior corner of the mandrel and capable of supporting and moving the wrap of filaments along at least a portion of the length of the mandrel;

5 (b) feeding at least one continuous base element of a melted polymeric bead outside of the wrap of polymeric filaments onto at least one selected portion of the mandrel and maintaining the polymeric bead in contact with the polymeric filaments of the wrap on the mandrel until the polymeric bead bonds with the polymeric filaments of the wrap as the polymeric
10 filaments of the wrap are being moved at least a portion of the length of the mandrel; and

 (c) cutting the polymeric filaments of the wrap at a point downstream of where the polymeric filaments of the wrap are bonded with the base element to form continuously at least one bristle subassembly having at
15 least one row of filament segments connected to the polymeric bead.

5. A bristle subassembly made according to the method comprising the steps of:

 (a) continuously forming a wrap of polymeric filaments by
20 wrapping at least one filament around the axis of at least a three sided mandrel having a moving cable support on each corner running the length of the mandrel on the exterior corner of the mandrel and capable of supporting and moving the wrap of filaments along a substantial length of the mandrel;

 (b) feeding a continuous stream of a bonding material
25 selected from the group consisting of a solvent for the polymeric filaments or an adhesive for the polymeric filaments outside of the wrap of polymeric filaments onto at least one selected portion of the mandrel and maintaining the bonding material and the filaments of the wrap on the mandrel in contact until the bonding material bonds with the filaments of the wraps; and

30 (c) cutting the filaments of the wrap at a point downstream of where the filaments of the wrap are bonded to each other to form at least one bristle subassembly having at least one row of filament segments bonded at the base of each bristle segment.